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(11) EP 1 035 746 A1

54) Portable terminal for protecting a predetermined area by means of a separate protection system

[001] The present invention relates to a mobile terminal for a wireless telecommunication system and a method for controlling the mobile terminal for protecting a predetermined area from disturbing usage of the mobile terminal. The mobile terminal (300) according to the present invention comprises transmitting and receiving means (301) for transmitting and receiving signals of the wireless telecommunication system, detecting means (310) for detecting protection signals of a wireless protection system different from the wireless telecommunication system for protecting a predetermined area from disturbing usage of the mobile terminal (300), and con-

trol means (321) for changing a mode of the mobile terminal into a protection mode depending on a detected protection signal from the detecting means (310) to protect said predetermined area. By separating the functions of the wireless telecommunication system and the functions of the wireless protection system in the mobile terminal according to the present invention, the mobile terminal (300) can still be remotely controlled on the basis of the wireless protection system although the functions or part of the functions of the wireless telecommunication system are disabled in order to protect the predetermined area.

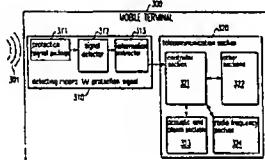


Fig. 3

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In the wireless protection system of can have additional functional features.

[0011] Advantageously, said control means of the mobile terminal changes the mode of the mobile terminal back from the protection mode to the original mode upon determining that the time elapsed since the last reception of a protection signal of said wireless shield system exceeds a predetermined time threshold.

[0012] This will ensure that on areas around the protection signal transmitter remains protected for a fixed amount of time against disturbing use of such mobile terminals even in the case that the protection signal were not continuously transmitted by the protection signal transmitter or continuously recognized by the protection signal detector in such mobile terminals.

[0013] This will also ensure that areas which can not be equipped for interference reasons with continuously transmitting protection signal transmitters (e.g. airplanes) can be protected against the disturbing use of such mobile terminals if the user of the mobile terminal has previously passed by an area protected by such shield transmitters.

[0014] This will further ensure that areas that can only be equipped with low duty cycle protection signal transmitters (e.g. battery, rechargeable or solar powered) can be protected against the disturbing use of such mobile terminals even in the case that the protection signals were not continuously transmitted by the protection signal transmitter or continuously recognized by the detector in such mobile terminals. The transmitted time information could e.g. indicate the expected flight duration plus an optional safety margin.

[0015] Advantageously, said control means of said mobile terminal maintains said protection mode until a time period received as time information with and protection signals has expired, whereby the mobile terminal is reset to the original mode thereafter.

[0016] This will ensure that on areas around the protection signal transmitter remains protected for an amount of time which is determined by the protection signal transmitter against the disturbing use of such mobile terminals even in the case that the protection signals were not continuously transmitted by the protection signal transmitter or continuously recognized by the detector in such mobile terminals. The transmitted time information could e.g. indicate the expected flight duration plus an optional safety margin.

[0017] This will also ensure that areas which can not be equipped with continuously transmitting protection signal transmitters (e.g. airplanes) can be protected against the disturbing use of such mobile terminals if the user of the mobile terminal has previously passed by an area protected by such protection signal transmitters.

[0018] This will further ensure that areas that can only be equipped with low duty cycle shield transmitters (e.g. battery, rechargeable or solar powered) can be protected against the disturbing use of such mobile terminals if the user of the mobile terminal has previously passed by an area protected by such protection signal transmitters.

[0019] Advantageously, in said protection mode at

least a high frequency portion of the transmitting and receiving means of said mobile telecommunication system is switched off. This is particularly advantageous in sensible environments, like airplanes, nuclear plants etc.

[0020] As soon as the mobile terminal detects the protection signals, it immediately switches off its high frequency portion to avoid interference with electronic facilities in the area. Further, in this case even incoming or outgoing emergency calls may be disabled for the simple reason that in such sensible locations, a personal emergency call can disrupt the well-being of the entire area.

[0021] This will eliminate any associated power consumption and undesirable or dangerous interference to other services or devices in the area to be protected.

[0022] Advantageously, in said protection mode of said mobile terminal only portions of the mobile terminal rotating is the wireless telecommunication system, but not portions of the mobile terminal relating to the wireless shield system are switched off.

[0023] This allows continuous detection and monitoring of any information obtainable from the wireless protection system.

[0024] Advantageously, said protection mode of the mobile terminal is a silence mode in which no volume of audible output signals of the mobile terminal is lowered.

[0025] This possibility is particularly advantageous in places like buses, restaurants etc., in which many people are close together, but don't want to be disturbed by each other's portable terminal.

[0026] This will avoid any objectionable nuisance to persons not concerned with said mobile terminal.

[0027] Advantageously, said protection mode of the mobile terminal is a silence mode in which audible output signals of the mobile terminal are suppressed.

[0028] This will avoid any conceivable nuisance to persons not concerned with said mobile terminal.

[0029] Advantageously, said suppressed output signals of the mobile terminal are replaced by visual or other non audible signals.

[0030] This will ensure that said mobile terminal for said wireless telecommunication system will retain normal functionality for the user concerned.

[0031] The present invention ensures that said mobile terminal for a wireless telecommunication system will abide to the restrictions imposed and transmitted by said wireless protection system.

[0032] This will further ensure that areas that can only be equipped with low duty cycle shield transmitters (e.g. battery, rechargeable or solar powered) can be protected against the disturbing use of such mobile terminals if the user of the mobile terminal has previously passed by an area protected by such protection signal transmitters.

[0033] The present invention will be explained in more detail in the following description by means of preferred embodiments relating to the enclosed drawings, in which

[0034] Figure 1 shows a typical application scenario employing the present invention.

[0035] Figure 2 shows a base station for transmitting protection signals according to the present invention.

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Description

[0001] The present invention relates to a mobile terminal for a wireless cellular telecommunication system for protecting a predetermined area from disturbing usage of this mobile terminal and to a method for protecting a predetermined area from disturbing usage of mobile terminals of a wireless cellular telecommunication system.

[0002] In many areas the use of mobile terminals of wireless telecommunication systems is regarded as a nuisance for other people, like in restaurants or in the opera, or even dangerous in places like hospitals or airplane. In the first case particularly audible signals output from mobile terminals are disturbing other people or the spectacle being given. In the second case, the use of mobile terminals, particularly the transmission of high frequency electromagnetic waves can disturb other electronic devices or lead to severe incidents. It is therefore very important to provide a way to protect predetermined areas from disturbing usage of mobile terminals within these areas. Particularly, the protection of a predetermined area should not depend on the user's will, a g. on a user's input of information to the mobile terminal.

[0003] EP 0 591 110 A1 discloses a method and a system for preventing a mobile terminal from causing disturbance within a predetermined area, a g. inside a plane inside of hospitals. Particularly, the disclosed method comprises the steps of transmitting a protection signal from a base station to a mobile terminal and deactivating a user of the output of the mobile terminal in response to the description signal. Thereby, the transmission signal is deactivated. The base station can either be an ordinary base station or a base station especially designed for transmitting the deactivation signal. According EP 0 591 110 A1 describes that the base station could be a specifically designed base station, if it is not described how the deactivation signals could be implemented and transmitted in an ordinary telecommunication system or how a mobile terminal can be implemented, to protect such an area from disturbing usage of mobile phones of different mobile networks.

[0004] The object of the present invention is therefore to provide a mobile terminal and a method for protecting a predetermined area from disturbing usage of this mobile terminal of a wireless cellular telecommunication system, which protects a predetermined area by transmitting mode change information for changing an operation mode of the mobile terminals in a simple and effective way.

[0005] The above object is achieved by a mobile terminal for a wireless telecommunication system, with transmitting and receiving means for transmitting and receiving signals of the wireless telecommunication system, detecting means for detecting protection signals of a wireless protection system different from said wireless protection system from said wireless

telecommunication system, and control means for changing a mode of the portable terminal into a protection mode depending on a detected protection signal from said detecting means, so that a predetermined area is protected from disturbing usage of the mobile terminal.

[0006] The above object is further achieved by a method for controlling a mobile terminal for a wireless telecommunication system, said mobile terminal comprising transmitting and receiving means for transmitting and receiving signals of the wireless telecommunication system, comprising the steps of detecting protection signals of a wireless protection system different from said wireless telecommunication system, and changing a mode of the portable terminal into a protection mode depending on a detected protection signal, so that a predetermined area is protected from disturbing usage of the mobile terminal.

[0007] Separating the function of detection/protection signals from performing functions for the wireless telecommunication system allows to completely deactivate function blocks for the wireless telecommunication system, thereby eliminating any associated power consumption and undesirable or deleterious interference to other services or devices in that area to be protected.

[0008] Nevertheless, said mobile terminal can switch back into normal mode automatically after leaving the protected area. The shape and size of the area protected by such a protection method can therefore be determined and chosen independently from the conditions that apply to the wireless telecommunication system. This can be achieved by choosing the transmission method for said protection signal so that this range is determined by the propagation and obstacles penetration characteristics of said protection signals and / or by applying navigation methods to determine the geographic position of the mobile terminal such as triangulation or path definition information carried or determined from said protection signal.

[0009] Using a short wavelength (typically decimeters or less) for said protection signal allows to determine the range and intended absorption in obstacles to limit the range. Natural propagation of RF waves causes a path attenuation which is proportional to d^{α} , where d is the distance between transmitter and receiver and α is the wavelength used. Typical home or office environments create even larger wave attenuation typically proportional to $d^{2\alpha}$ for a distance of about 10 meters.

[0010] Advantageously, said control means of said mobile terminal maintains the protection mode as long as the detecting means detects said protection signals of said wireless protection system.

[0011] This will ensure that on areas around a protection signal transmitter is protected against the disturbing use of each mobile terminal just as long as the protection signal is recognized. The transmitter transmitting the protection signals can be a device operating solely

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and

[0012] Figure 3 shows a mobile terminal for a wireless telecommunication system and for detecting protection signals of a wireless protection system according to the present invention.

[0013] Figure 3 shows a mobile terminal 300 comprising a pickup means 311 for picking up protection signals, i.e. a radiated protection signal energy, and supplies the picked up protection signal to a protection signal detecting means 312 for detecting and demodulating the picked up protection signal.

[0014] The demodulated protection signals are supplied to an information extracting means 313, which recognizes relevant protection signals for the respective mobile terminal, e.g. the mobile terminal 300, and supplies the extracted information to a controlling section 321 or to a telecommunication section 320. The controlling section 321 controls the changeover of the mode of the mobile terminal 300 into the protection mode according to the present invention. Thereby, the controlling section 321 controls on acoustic and alarm section 323 to output a warning signal to the user that a mode changeover into a protection mode is performed. Furthermore, the controlling section 321 controls a radio frequency section 324 for switching off at least the radio frequency parts of the mobile terminal 300. The telecommunication section 320 of the mobile terminal 300 further comprises other section 322 for operating the mobile terminal 300 in the wireless telecommunication system, i.e. for communicating data, e.g. with a normal base station of the telecommunication system within protected areas.

[0015] The controlling section 321 can maintain the protection mode as long as the detecting means 310 detects protection signals of the wireless protection system. Further, the controlling section 321 can change the mode of the mobile terminal 300 back from the protection mode to the original mode upon determining that a predetermined time elapsed since the last reception of a protection signal by the pick-up means 311.

[0016] Alternatively, the controlling section 321 can maintain the protection mode of the mobile terminal 300 until a time period received as time information with the protection signal has expired, whereby the mobile terminal 300 is reset to the original mode thereafter. This implies that the protection signal transmitter, e.g. the protection signal transmitter 200, further generates a timing signal which is transmitted with the protection signals.

[0017] The controlling section 321, upon detection of a protection signal by the detecting means 310, controls the radio frequency section 324 of the telecommunication section 320 of the mobile terminal 300. Thereby, in the protection mode, only portions of the mobile terminal 300 relating to the wireless telecommunication system but not portions of the mobile terminal 300 relating to the wireless protection system, e.g. the detecting means 310, are switched off.

[0018] Depending on the protection level to be achieved, which might be different for different areas, e.g. hospitals, airplanes or restaurants, the protection

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[0019] protection signal detecting means 310 of the mobile terminal 300 comprises a pickup means 311 for picking up protection signals, i.e. a radiated protection signal energy, and supplies the picked up protection signal to a protection signal detecting means 312 for detecting and demodulating the picked up protection signal.

[0020] The demodulated protection signals are supplied to an information extracting means 313, which recognizes relevant protection signals for the respective mobile terminal, e.g. the mobile terminal 300, and supplies the extracted information to a controlling section 321 or to a telecommunication section 320. The controlling section 321 controls the changeover of the mode of the mobile terminal 300 into the protection mode according to the present invention. Thereby, the controlling section 321 controls on acoustic and alarm section 323 to output a warning signal to the user that a mode changeover into a protection mode is performed. Furthermore, the controlling section 321 controls a radio frequency section 324 for switching off at least the radio frequency parts of the mobile terminal 300. The telecommunication section 320 of the mobile terminal 300 further comprises other section 322 for operating the mobile terminal 300 in the wireless telecommunication system, i.e. for communicating data, e.g. with a normal base station of the telecommunication system within protected areas.

[0021] The controlling section 321 can maintain the protection mode as long as the detecting means 310 detects protection signals of the wireless protection system. Further, the controlling section 321 can change the mode of the mobile terminal 300 back from the protection mode to the original mode upon determining that a predetermined time elapsed since the last reception of a protection signal by the pick-up means 311.

[0022] Alternatively, the controlling section 321 can maintain the protection mode of the mobile terminal 300 until a time period received as time information with the protection signal has expired, whereby the mobile terminal 300 is reset to the original mode thereafter. This implies that the protection signal transmitter, e.g. the protection signal transmitter 200, further generates a timing signal which is transmitted with the protection signals.

[0023] The controlling section 321, upon detection of a protection signal by the detecting means 310, controls the radio frequency section 324 of the telecommunication section 320 of the mobile terminal 300. Thereby, in the protection mode, only portions of the mobile terminal 300 relating to the wireless telecommunication system but not portions of the mobile terminal 300 relating to the wireless protection system, e.g. the detecting means 310, are switched off.

[0024] Depending on the protection level to be achieved, which might be different for different areas, e.g. hospitals, airplanes or restaurants, the protection

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mode of the mobile terminal 300 may also be a silence mode in which the volume of audible output signals of the mobile terminal 300 is lowered or in which the audible output signals are completely suppressed. In this case, the controlling section 321 controls the acoustic alarm section 322 to suppress or at least lower audio output signals of the mobile terminal 300. Further, the controlling section 321 may in this case replace the suppressed audible output signals by visual or other non-audible signals.

[0040] In suitable areas, e.g. hospitals, airplanes, nuclear plants etc., the base station or protection signal transmitter 200 of the present invention, see e.g. shown in Figure 2, can further comprise security means for preventing any mishandling and misuse. E.g., if the protection signal transmitter 200 can comprise a movement detection means for detecting movements of the protection signal transmitter 200, whereby the movement detection means causes a switching off of the protection signal transmitter upon detection of a movement. In this case, protection against theft and misuse is ensured. Further, the protection signal transmitter 200 might comprise an input means for inputting a security code to be input to switch on the protection signal transmitter 200.

[0041] In less sensitive areas, as e.g. restaurants or theaters, in which the protection signal transmitter 200 transmits protection signals for switching off or at least lowering audible signals output from mobile terminals within the predetermined area, might also comprise security means for preventing any mishandling and misuse as explained above.

[0042] In the following possible technical implementations of the wireless telecommunication system as well as for the wireless protection system according to the present invention are described, whereby in any case different systems have to be used for the wireless telecommunication system and the wireless protection system according to the present invention, so that interferences between the two systems are avoided. The wireless telecommunication system and the wireless protection system can be based on the following principles:

[0043] Time Division Multiple Access (TDMA). Examples implementations of cellular systems based on this principle are the ETSI Standard GSM, as described in Chapters 3-11 of "An Introduction to GSM" from Redl, Weber, Oliphant, Artech House, 1995; the Standards NADC, IS-54, IS-136, as described in Chapter 12 of this book, and RCR/ARIB PDC. Examples of cordless systems based on this principle are standardized as ETSI DECT, RCR/ARIB PHS, EIA PWX, and Bluetooth.

[0044] CDMA (Code Division Multiple Access), e.g. EIA/TIA IS-95, EIA/TIA IS-95A, EIA/TIA IS-95B, as described in Chapter 13 of "An Introduction to GSM" as mentioned above.

[0045] TD-CDMA (Time Division-Code Division Multiple Access).

[0046] Analog continuous-time transmission methods

such as AM, FM, SSB

[0047] Compressed time / time-slot versions of systems based on analog transmission methods

[0048] Broadcast systems (FM, AM, COFDM, e.g. DAB)

[0049] Pager systems (POCSAG).

[0050] Optical/infrared systems

[0051] Acoustic/ultrasonic systems

[0052] Hereafter some advantageous types of implementations of transmission methods for the wireless protection system of the present invention are considered.

[0053] It is suggested to use a short wavelength (decimeters and less) to determine a short range of protection around a station, which is transmitting protection signals of a wireless protection system. Absorption in obstacles can be planned as desired. Natural propagation of RF waves causes a path attenuation which is proportional to $4\pi d/\lambda^2$, where d is the distance between transmitter and receiver and λ is the wavelength used. Typical home or office environments create even larger wave attenuation typically proportional to $4\pi d/\lambda^2$ above a distance of about 10 meters.

[0054] Different possible implementations of the protection system have each specific characteristics, advantages and disadvantages:

[0055] Radio frequency systems, i.e. systems which use radio frequency protection signals, yield a good coverage range per transmitted power. A long range is therefore possible, depending on selected transmit power, receiver sensitivity, wavelength, and anticipated interference. An omni-directional radiator can be implemented easily in the protection signal transmitter, resulting in almost circular or spherical ranges. Radio frequency waves pass through some obstacles and encounter reflection, depending on the selected wavelength, therefore a line of sight between transmitter and receiver is usually not required. As an example, the protection system could be implemented using Bluetooth as the basic standard.

[0056] Optical systems typically have a short range per transmitted power. Radiators are usually directional such as in the case of an LED. Some gain in range or transmit power reduction can be achieved by concentration of radiation. Omni-directional radiators are big and heavy. Scattering can remove the restrictions of directional radiators at the expense of transmit power. Optical systems can be implemented in a cost efficient way. Particularly transmitters can be very cheap. System approval can be obtained easily. Radiation does not pass through most of the common obstacles such as walls or furniture. That could be a desired feature. A line of sight path between transmitter and receiver is usually required. Optical systems generate low interference to other devices or services. Few health considerations arise from their use.

[0057] As an example, the protection system could be implemented using infrared technology e.g. from home appli-

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ances remote controls as the basic standard.

[0058] Acoustic systems typically have a short to medium range. The required transmit power per range obtained is rather high. Typical systems have a directional radiator such as a piezoelectric speaker. Acoustic waves are scattered, reflected and reflected by most of the usual objects in home or office environments, therefore a line of sight between transmitter and receiver is usually not required. Radiation does not pass through most of the common obstacles such as walls, windows, furniture. System approval can be obtained easily. Acoustic systems generate low interference to other devices or services and only few health considerations arise from their use.

As an example, the protection system could be implemented using ultrasonic technology e.g. from home appliance remote controls as the basic standard.

[0059] As a preferred example, the protection system could be implemented using radio frequency technology based on "Bluetooth".

Bluetooth is a standard which is currently still under development. Bluetooth supports wireless ad-hoc voice and data connectivity. Bluetooth is a TDMA/DDFHSS system that operates in the unlicensed 2.4 GHz ISM band, frequencies for its operation have been allocated worldwide. A range of 10 meters or even 100 meters (using higher transmit power) can be achieved. No line-of-sight is necessary for a successful communication. Due to features like worldwide ad-hoc connectivity, low power, small size and ease of integration, Bluetooth is very well suited to the requirements of a protection system according to this invention. A Bluetooth subsystem can be implemented on one single silicon chip. A Bluetooth subsystem can also be integrated into existing chip designs.

Claims

1. Mobile terminal (300) for a wireless telecommunication system, with transmitting and receiving means (320) for transmitting and receiving signals of the wireless telecommunication system, comprising the steps of
 - detecting protection signals of a wireless protection system different from said wireless telecommunication system, and changing a mode of the mobile terminal into a protection mode depending on a detected protection signal for protecting a predetermined area from disturbing usage of the mobile terminal,
 - Method for controlling a mobile terminal for a wireless telecommunication system, said mobile terminal comprising transmitting and receiving means for transmitting and receiving signals of the wireless telecommunication system, comprising the steps of
 - detecting protection signals of a wireless protection system different from said wireless telecommunication system, and changing a mode of the mobile terminal into a protection mode depending on a detected protection signal for protecting a predetermined area from disturbing usage of the mobile terminal,
2. Mobile terminal (300) for a wireless telecommunication system according to claim 1, characterized in, that in said protection mode only portions of the mobile terminal relating to the wireless telecommunication system but not portions of the mobile terminal relating to the wireless shield system are switched off.
3. Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 1 to 13, characterized in, that said protection mode of the mobile terminal is a silence mode in which the volume of audible output signals of the mobile terminal is lowered.
4. Method for controlling a mobile terminal for a wireless telecommunication system according to claim 16, characterized in, that said protection mode of the mobile terminal is a silence mode in which audible output signals of the mobile terminal are suppressed.
5. Method for controlling a mobile terminal for a wireless telecommunication system according to claim 17, characterized in, that said suppressed output signals of the mobile terminal are replaced by visual or other non audible signals.
6. Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 13, characterized in, that the mode of the mobile terminal is changed back from the protection mode to the original mode upon determining that the time elapsed since the last reception of a protection signal of said wireless shield system exceeds a predetermined time threshold.
7. Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 11, characterized in, that said protection mode is maintained until a time period received as time information with said protection signal has expired, whereby the mobile terminal is reset to the original mode thereafter.
8. Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 13, characterized in, that in said protection mode at least a high frequency portion of said transmitting and receiving means is switched off.
9. Method for controlling a mobile terminal for a wireless telecommunication system according to claim 14, characterized in,

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terminal are replaced by visual or other non audible signals.

[0060] Method for controlling a mobile terminal for a wireless telecommunication system, said mobile terminal comprising transmitting and receiving means for transmitting and receiving signals of the wireless telecommunication system, comprising the steps of

- detecting protection signals of a wireless protection system different from said wireless telecommunication system, and changing a mode of the mobile terminal into a protection mode depending on a detected protection signal for protecting a predetermined area from disturbing usage of the mobile terminal,
- Method for controlling a mobile terminal for a wireless telecommunication system according to claim 10, characterized in, that the protection mode is maintained as long as said protection signals of said wireless protection system are detected
- Method for controlling a mobile terminal for a wireless telecommunication system according to claim 10 or 11, characterized in, that the mode of the mobile terminal is changed back from the protection mode to the original mode upon determining that the time elapsed since the last reception of a protection signal of said wireless shield system exceeds a predetermined time threshold.
- Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 13, characterized in, that in said protection mode at least a high frequency portion of said transmitting and receiving means is switched off.
- Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 13, characterized in, that in said protection mode at least a high frequency portion of said transmitting and receiving means is switched off.
- Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 13, characterized in, that in said protection mode at least a high frequency portion of said transmitting and receiving means is switched off.
- Method for controlling a mobile terminal for a wireless telecommunication system according to one of the claims 10 to 13, characterized in, that in said protection mode at least a high frequency portion of said transmitting and receiving means is switched off.

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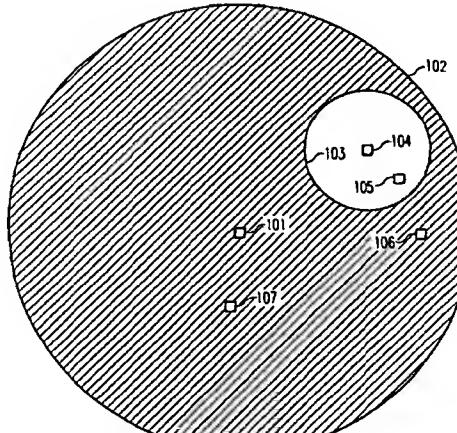


Fig. 1

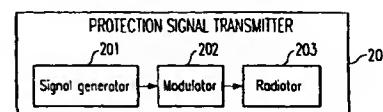


Fig. 2

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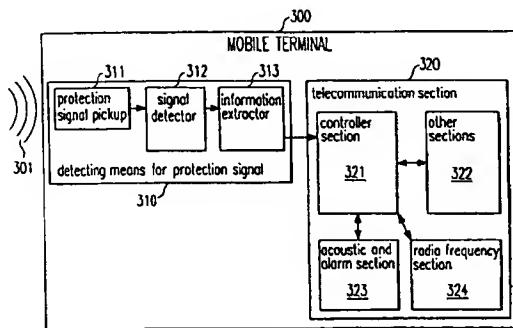


Fig. 3

DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
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A		
P,X	WO 99 18745 A (FEITSCH ALEXANDER ;MALE RENE (AT); POSTMANN ERWIN (AT); STRAKA PE 15 April 1999 (1999-04-15) + the whole document +	1,5,6, 8-10,14, 15,17,18
CLASSIFICATION OF THE APPLICATION (SPECIFY)		
TECHNICAL FIELDS SEARCHED (W.O.T.)		
H04Q		

The present search report has been drawn up for all claims

From 1 month	General description of the search
THE HAGUE	1 November 1999
	Mehmiller, J

SEARCHERS AND EXAMINERS COMMENTS

CATEGORY OF CITED DOCUMENTS

- E : Early or relevant European patent application
- F : Early or relevant U.S. patent or publication
- G : Early or relevant Japanese patent or publication
- H : Early or relevant German patent or publication
- A : Technological subject category
- D : Non-electronic disclosure
- P : Prior art document
- S : Document of the same patent family, corresponding to this patent

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 99 10 7646

This annex lists the current family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EPO file on:
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01-11-1999

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